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SHOWERHEAD
[Shawaaheddo]

Masatoshi Enoki

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INVENTOR (72): Masatoshi Enoki

APPLICANT (71): Toto Kiki Co., Ltd.

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Claims

1. A showerhead characterized in that a pressure regulation chamber is formed inside a water discharge head to be connected to water and hot water supply sources; water discharge holes are created on one surface of said pressure regulation chamber to form a water discharge surface; a water discharge plate different from said water discharge surface is provided on the aforementioned water discharge head; a flow path that links the aforementioned pressure regulation chamber to the water discharge holes created on said water discharge plate is formed inside the aforementioned water discharge head; a piston that can be moved by the pressure of inflow water and hot water is housed inside the aforementioned pressure regulation chamber; and the flow path linked to the water discharge holes of the aforementioned water discharge plate is opened and closed through a movement of the aforementioned piston.

2. The showerhead described under Claim 1, characterized in that the aforementioned piston is linked to an adjustment knob that can be manipulated from outside the aforementioned water discharge head while allowing said piston to be set at an arbitrary position in the direction it moves.

Detailed explanation of the invention

Industrial application field

The present invention pertains to a showerhead that can be used under constant pressure at all times even when the pressure of the supplied water and hot water is changed while allowing changing of the form of the discharged water as desired.

Prior art

Showerheads installed in bathrooms or on recent wide-spreading washstands that also enable shampooing come in a wide variety. For example, one that discharges pulsating water to achieve a

massaging function and one that spreads discharged water or discharges a concentrated fine stream of water may be mentioned. In any case, the basic idea is to change the form of the water discharged, and showerheads are devised in such a manner that water is discharged in a form that is appropriate for a given purpose, such as shampooing, face-washing, body-washing, and so forth.

Figure 4 is a cross-sectional view of the main part of a showerhead for variable water discharge forms.

In the figure, water discharge plate 51 is provided at the front end of showerhead's main body 50, and fine streams of shower water are discharged through many holes 52 that are created over its entire surface. A showerhead created by fixing said water discharge plate 51 to main body 50 has been used widely. Water discharge plate 51 is attached in a rotatable fashion to supporting mount 53 that is provided inside main body 50 using screw 54 in order to attain a variety of forms of discharged water. When water discharge plate 51 is turned with a fingertip, water discharge plate 51 moves in the direction indicated by arrows in Figure 4 due to the presence of screw 54. The size of the gap between gasket 55 that is provided on the circumferential surface of water discharge plate 51 and opening 56 at the front end of main body 50 is changed as a result of said movement. That is, as shown in Figure 5 (enlarged view of the part surrounded by the chain line circle in Figure 4), width 1 of the gap between gasket 55 and opening 56 gets wider as water discharge plate 51 is farther separated, and it gets narrower as the plate moves toward main body 50. Therefore, water is discharged in fine streams when width 1 is narrow, and larger streams of water are discharged as width 1 widens. A variety of water discharge forms can be achieved by moving water discharge plate 51 relative to main body 50 in said manner.

In addition to said use of the movement of water discharge plate 51, showerheads in which two overlapping water discharge plates 51 are provided, with one of them being rotated so as to shift holes 52 in order to alter the water discharge form have long been widely utilized.

Problems to be solved by the invention

However, including the showerhead in which water discharge plate 51 is fixed to main body 50, the shower water pressure is determined by the pressure of the water and the hot water supplied to main body 50. That is, when the pressure of the supplied water and the hot water is high, the pressure of the water discharged through water discharge plate 51 is high. In contrast, when the pressure of the water and the hot water is low, the force of the discharged water is weak. Thus, when the pressure of the supplied water and the hot water is changed, the force of the discharged water applied to the person taking a shower also changes; and the pressure has to be adjusted using a handle, such as a combination facet, if it is too high.

In addition, even when the form of the discharged water is changed based on movement of the water discharge plate 51 of the kind shown in Figure 4 and Figure 5, the same problem remains. In particular, because the velocity of the streams is high when fine streams of water are discharged, if the pressure of the supply source is increased, the force of the discharged water is sometimes intensified so much that pain may be felt as when the water hits the skin.

As described above, conventional showerheads are susceptible to changes in the pressure in the water/hot water supply. As such, to use them comfortably, the operation using a handle, such as a combination facet, has to be carried out on the supply side, resulting in a problem in terms of ease of use.

Accordingly, the objective of the present invention is to enable maintenance of a constant pressure of discharged water even when the pressure of the water and hot water supplied changes while allowing the form of discharged water to be changed easily in order to improve the ease of use.

Means to solve the problems

In order to achieve the aforementioned objective, the present invention is characterized in that a pressure regulation chamber is formed inside a water discharge head to be connected to water and hot

water supply sources; water discharge holes are created on one surface of said pressure regulation chamber to form a water discharge surface; a water discharge plate different from said water discharge surface is provided on the aforementioned water discharge head; a flow path that links the aforementioned pressure regulation chamber to the water discharge holes created on said water discharge plate is formed inside the aforementioned water discharge head; a piston that can be moved by the pressure of inflow water and hot water is housed inside the aforementioned pressure regulation chamber; and the flow path linked to the water discharge holes of the aforementioned water discharge plate is opened and closed through a movement of the aforementioned piston.

In addition, when the piston is linked to an adjustment knob that can be manipulated from outside the aforementioned water discharge head while allowing the piston to be set at an arbitrary position in the direction it moves, the flow path that links to the water discharge holes of the water discharge plate can be opened/closed in advance in order to set a water discharge form. Here, when the piston is biased using a spring linked to an adjustment knob, the load applied to the piston by the spring can be changed, so that the intensity of the discharged water can be set, and an adjustment can be made easily so as to attain a water force desired by the user.

Operation of the invention

The water and the hot water that have flowed into the water discharge head are discharged through the water discharge holes created on the water discharge surface. On the other hand, the piston is moved in the direction of increase in the internal volume of the pressure adjustment chamber due to the pressure of the inflow water. Then, the flow path linked from the pressure adjustment chamber to the water discharge holes of the water discharge plate is kept open or closed as the piston is moved. When a setting is made such that the amount the piston is moved is increased when the water pressure is high, and the flow path is opened according to said amount of movement, water is discharged also through

water discharge holes of the water discharge plate provided separately in addition to the water discharged only from the water discharge surface.

In addition, when the position of the piston is preset using a manipulation knob, the flow path to the water discharge holes of the water discharge plate can be opened even with a low pressure, so that the form of the discharged water can be set accordingly.

Application examples

Specific characteristics of the present invention will be explained below using an application example shown in figures.

Figure 1 is a cross-sectional view of the main part of a showerhead as an application example of the present invention, and Figure 2 is a front view of the main part.

In the figures, quasi-semispherical water discharge head 2 is formed at the front end of showerhead main body 1, and tabular water discharge plate 3 with water discharge holes 3b is fixed to one of its surfaces using screw 3a. Pressure adjustment chamber 4, whose axis line intersects water discharge plate 3 orthogonally, is formed roughly at the center of water discharge head 2; and water and hot water supplied to main body 1 through a combination faucet first flow into said pressure adjustment chamber 4.

Pressure adjustment chamber 4 is formed from the side of water discharge plate 3 through water discharge head 2 to its rear surface, wherein round water discharge surface 4a is provided at the part included in water discharge plate 3, and many holes 4b are created on said surface. In addition, water-conduction holes 5, 6, and 7 for leading the water to the side of water discharge plate 3 are created on the inner wall of pressure adjustment chamber 4 that occupies roughly the rear half of the area of water discharge head 2. These water-conduction holes 5-7 are linked respectively to 3 flow paths 8, 9, and 10 that are led to water discharge plate 3. That is, these flow paths 8-10 are formed inside water discharge head 2 using 2 partition walls 11 and 12 in order to allow a part of the water to flow into

pressure adjustment chamber 4 toward the side of water discharge plate 3. Flow paths 8-10 have an annular cross-section when looked at from a direction perpendicular to the axis line of pressure adjustment chamber 4, and they include 3 rows of ring-shaped water discharge holes 3b created on water discharge plate 3 in the radial direction to allow passage of water. Here, the arrangement of water-conduction holes 6 at the position of the I-I line indicated by arrows in Figure 1 is shown in Figure 3.

Furthermore, piston 13 is housed in a slidable fashion within inner wall 4c having water-conduction holes 5-7 inside pressure adjustment chamber 4. Adjustment knob 14 for setting the pressure that is adjusted using piston 13 is screwed into the rear surface of water discharge head 2 in a rotatable fashion, and spring 15 is incorporated between said adjustment knob 14 and piston 13. Gasket 13a is attached to the circumferential surface of piston 13, and it is placed tightly at inner circumferential wall 4c of pressure adjustment chamber 4 in order to prevent the flow of water to flow paths 8-9. Spring 15 is a compression type, and it biases piston 13 to water discharge surface side 4a while supporting piston 13 in such a manner that it can be moved in the direction indicated by arrows in the figure based on the pressure of the water and the hot water that has flowed into pressure adjustment chamber 4. In addition, adjustment knob 14 is connected to water discharge head 2 in a rotatable fashion using screw 14a, whereby its distance to piston 13 can be changed. That is, when water discharge head 2 is screwed in further, piston 13 is pushed down to water discharge surface side 4a, whereby the biasing force of spring 15 can be set at a high level. In addition, when adjustment knob 14 is moved in the removal direction, piston 13 is moved to adjustment knob side 14, and the biasing force of spring 15 is at a low level.

Here, during the setting of the positions of spring 15 and piston 13, piston 13 should be set in such a manner that it fits the lowest water-conduction holes 5 as shown in Figure 1 or positioned on water

discharge surface side 4a when no water or hot water is supplied. Under said setting, spring 15 achieves its natural length, and the flow paths to respective water-conduction holes 5-7 are blocked by piston 13.

In the case of the aforementioned configuration, when water or hot water is supplied to main body 1, it flows into pressure adjustment chamber 4 and is discharged through water discharge holes 4b. At this time, water pressure for pushing spring 15 is acted upon piston 13. Thus, as the pressure of the supplied water is increased, piston 13 moves gradually toward adjustment knob 14. Therefore, when the spring constant of spring 15 and the pressure-receiving of piston 13 are set properly, piston 13 is moved to the position where lowest water-conduction holes 5 are opened when a water pressure equal to or in excess of a prescribed value is reached. As a result, the supplied water and hot water also flow into flow path 8 and are discharged through surrounding water discharge holes 3b of discharge plate 3 in addition to the water discharged through water discharge holes 4b created at the center. Then, as the water pressure is further increased, piston 13 is moved until it bumps into manipulation knob 14. As a result, upper water-conduction holes 6 and 7 are opened, the water flows also into flow paths 8 and 9, and the water is discharged through water discharge surface 4a at the center and the entire surrounding water discharge plate 3.

Flow paths 8, 9, and 10 are opened in sequence as the pressure of supplied water is increased in the aforementioned manner. On the other hand, when the water is discharged only through water discharge holes 4b of water discharge surface 4a, for example, the force of the supplied water becomes intense as the pressure of the supplied water or the flow rate is increased. In contrast, when the water is discharged using a wider flow path area utilizing flow paths 8-9 as the pressure of the supplied water or the flow rate is increased, the force of the water never intensifies, and it can be kept roughly at a fixed value. Thus, even when the pressure of the supplied water or the flow rate is changed, the increase/decrease of the flow paths is compensated automatically by piston 13 placed inside of pressure adjustment chamber 4. Therefore, the pressure of the discharged water never changes. Even if it were changed, it is not

necessary to operate a handle, for example, manipulation knob 14 or a faucet provided at the supply source side, and one can continue to take a shower in comfort.

In addition, when adjustment knob 14 is set farther pulled out of water discharge head 2 as compared to the condition shown in Figure 1, piston 13 can be brought to a position where upper water-conduction holes 6 are closed by passing by the position of water-conduction holes 5. As such, because water-conduction holes 5 and flow path 8 are already open at the time a shower is about to be taken, the water can be discharged also through the row of water-conduction holes 3b that are closest to the center of water discharge plate 3. Therefore, the water discharge condition can be changed easily by setting manipulation knob 14 to increase or decrease the water discharge area. Obviously, in the event of a change in the pressure of the supplied water and the flow rate, the pressure is adjusted by piston 13 in order to restrain the change in the pressure of the supplied water.

Effect of the invention

As explained above, in the case of the showerhead of the present invention, a piston that responds to a change in the pressure of the water and the hot water supplied or their flow rate is provided, and the ultimate water discharge area is increased using said piston when the pressure of the water supplied is increased. Thus, the pressure of the discharged water can be kept constant even if changes occur in the pressure of the supply source, so that the operation of a handle such as a combination faucet on the supply source side becomes obsolete. Therefore, a shower can be taken continuously without feeling any pain that would otherwise be caused in the event of a sudden change in the force of the water, and the ease of use can be improved significantly.

In addition, when the position of the piston is preset using the manipulation knob, the size of the water discharge area can also be set. Thus, not only can changes in the pressure of the discharged water be restrained, but any water discharge form can also be selected utilizing movement of the piston.

Therefore, a uniform water discharge pressure and the selection of a water discharge form can be achieved using a compact configuration, so enlarging of the showerhead for easy use can be prevented.

Brief description of the figures

Figure 1 is a vertical cross-sectional view of the main part of the showerhead of the present invention; Figure 2 is a bottom view of the main part; Figure 3 is a view along the I-I line indicated by arrows in Figure 1, wherein a cross-sectional view showing the arrangement of water-conduction holes is shown; Figure 4 is a cross-sectional view of a conventional example; and Figure 5 is an enlarged view of the main part of Figure 4.

1: main body; 2: water discharge head; 3: water discharge plate; 3a: screw; 3b: water discharge hole; 4: pressure adjustment chamber; 4a: water discharge surface; 4b: water discharge hole; 4c: inner circumferential wall; 5, 6, 7: water-conduction hole; 8, 9, 10: flow path; 11, 12: partitioning wall; 13: piston; 13a: gasket; 14: adjustment knob; 14a: screw; and 15: spring.

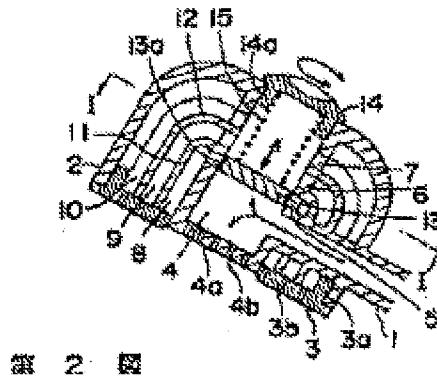


Figure 1

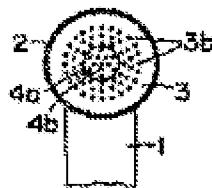


Figure 2

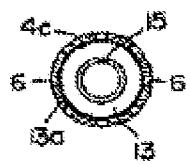


Figure 3

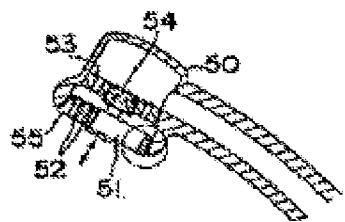


Figure 4

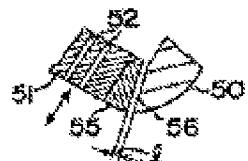


Figure 5